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(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 332 845 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.08.2003 Bulletin 2003/32

(51) Int Cl.[7]: **B26D 7/01**, B26F 1/36

(21) Application number: **03001961.6**

(22) Date of filing: **30.01.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT SE SI SK TR
Designated Extension States:
AL LT LV MK RO

(30) Priority: **31.01.2002 GB 0202304**

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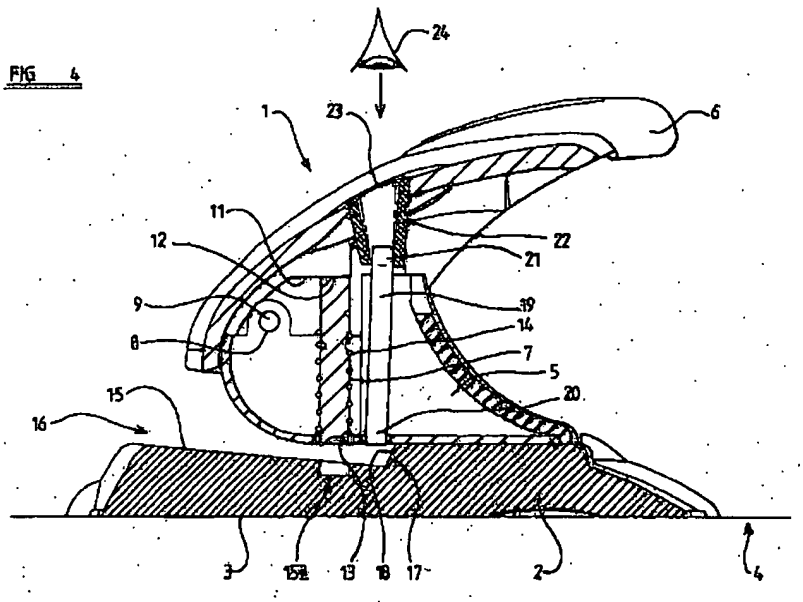
(54) Hole punch

(57) A hole punch (1) for punching holes through a sheet article or a stack of sheet articles. The hole punch (1) comprises a base (2) and at least one cutting element where the or each cutting element or elements is or are operable to move towards the base (2). The base (2) has a substantially planar supporting surface (3) and an engaging surface (15) to engage the face of a sheet article to be punched. Locating means (18) are provided to engage an edge of the or each sheet article in a predetermined position relative to the or each cutting element. The engaging surface (15) is inclined with respect to the supporting surface (3); in the most preferred embodiment, the angle of inclination of the engaging surface (15) with respect to the supporting surface (3) is 8°.

FIG 4



EP 1 332 845 A2

Description

[0001] THE PRESENT INVENTION relates to a hole punch for punching holes through a sheet article or stack of sheet articles, such as paper and other stationery.

[0002] As is commonly known in the art, single or multiple sheets of paper, card or other sheet-like articles may be punched with such a device. Such articles must be inserted into a slot in the hole punch, before the device is operated and holes are formed in the articles.

[0003] A hole punch configured to punch circular holes commonly consists of one or more cylindrical cutting elements which may be forced through the articles to be punched using a sprung plunger device. The articles must be correctly loaded into the hole punch, in order to achieve a desirable result. For example, paper must be inserted into a hole punch to a predetermined position, in order that the holes are punched at a suitable distance from the edge of the sheet. If the holes are punched too close to the edge of the sheet, then the sheet may easily be ripped.

[0004] Articles such as paper which have been punched in such a device are commonly stored in binders or folders having rings of corresponding orientation and dimension to the cutting elements of the hole punch.

[0005] However, a serious problem may arise when using such prior hole punch devices. It is often difficult for the operator to know when the paper has been fully inserted into the slot of the hole punch. If the operator forces paper into the slot, in order to ensure that it is inserted to its fullest extent, then the edges of the paper may be damaged. Conversely, if the operator is not aware that the paper is not inserted sufficiently, then holes may be punched too close to, or across the edge of the paper. An additional problem arises in that once paper has been loaded into the hole punch, it may easily slip back out before operation of the punch and therefore holes may be punched at an inappropriate place. This problem arises due to the slots of prior hole punches being horizontal in use (typically with the punch resting on a worksurface such as a table top), and therefore providing no positive encouragement for the paper to enter the slot fully and remain in position.

[0006] The present invention seeks to provide an improved hole punch.

[0007] In accordance with the present invention, there is provided a hole punch for punching holes through a sheet article or a stack of sheet articles, the hole punch comprising:

a base and at least one cutting element, the or each cutting element being operable to move towards the base;

the base having a substantially planar supporting surface for engagement with a worksurface, an opposed engaging surface to engage the face of a sheet article to be punched, and locating means configured to engage an edge of the or each sheet article in a predetermined position relative to the or each cutting element, wherein the engaging surface is inclined with respect to the supporting surface such that the engaging surface has a minimum spacing from the support surface substantially at the position of the locating means.

[0008] Preferably, the engaging surface is substantially planar.

[0009] Advantageously, the angle of inclination of the engaging surface with respect to the supporting surface is between 1° and 15°.

[0010] Preferably, the angle of inclination of the engaging surface with respect to the supporting surface is between 4° and 12°.

[0011] Conveniently, the angle of inclination of the engaging surface with respect to the supporting surface is 8°.

[0012] In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a hole punch in accordance with the present invention, from above, the front, and one side;

FIGURE 2 is a perspective view of the hole punch of Figure 1, from above, the rear, and the other side;

FIGURE 3 is a plan view from above of a hole punch in accordance with the present invention;

FIGURE 4 is a partial cross-sectional view of the hole punch of Figure 3, taken through the line A-A;

FIGURE 5 is a partial cross-sectional view corresponding to that of Figure 4, but illustrating the hole punch in an alternate, in use position; and

FIGURE 6 is a partly exploded cross-sectional view of a component of a preferred embodiment of the present invention.

[0013] Referring initially to Figures 1 and 2 of the accompanying drawings, there is illustrated a hole punch 1 generally in accordance with the present invention. The hole punch 1 comprises a base unit 2 having a planar, or substantially planar undersurface 3 (illustrated in Figure 4) to facilitate secure positioning of the base 2 of the hole punch 1, upon a static worksurface 4, such as, for example, the upper surface of a table or workbench.

[0014] Upstanding from the base 2, are a pair of spaced apart, opposed and substantially identical planar flanges 5 to which is pivotally mounted an operating handle 6. As will be described in more detail hereinafter, the pivotally mounted operating handle 6 is operatively

connected to a pair of moveable cutting elements 7 in the form of substantially cylindrical metal pistons which are vertically moveable with respect to the base 2 in a manner known *per se*.

[0015] Turning now to consider in more detail Figure 4, each upstanding flange 5 is provided with an aperture 8 therethrough. The two apertures 8 are aligned with one another, and each aperture 8 receives therein, as a rotational fit, a spigot 9 extending inwardly from a respective planar sidewall 10 of the handle 6. Each sidewall 10 of the handle 6 is disposed against the outer surface of a respective upstanding flange 5.

[0016] It will therefore be clear that the rotatable spigots 9, by virtue of their engagement within the apertures 8 provided in the upstanding flanges 5, pivotally mount the handle 6 with respect to the base 2 such that the handle 6 can be manually actuated between the initial position illustrated in Figure 4, and the alternate, operative position illustrated in Figure 5.

[0017] In the region of each cutting element 7, the operating handle 6 is provided with a bearing surface 11 arranged to bear against the uppermost surface 12 of a respective cutting element 7. Therefore, as illustrated in Figures 4 and 5, actuation of the operating handle 6 from the initial position illustrated in Figure 4, to the operative position illustrated in Figure 5, causes the bearing surfaces 11, by virtue of their engagement with the upper surfaces 12 of respective cutting elements 7, to urge the cutting elements 7 downwardly towards the base 2 such that the lower, sharpened edges 13 of the cutting elements approach the base 2.

[0018] Each cutting element 7 is biased towards its initial position illustrated in Figure 4, by virtue of a helical compression spring 14 disposed around the respective cutting elements 7, also in a manner known *per se* in the field of hole punches.

[0019] At a position immediately vertically below each cutting element 7, a substantially cylindrical recess 15a is provided in the engaging surface 15. Each cylindrical surface 15 is sized and configured to receive therein the lowermost end of the respective cutting elements 7, as the cutting elements 7 approach their operative positions, as illustrated in Figure 5. It will therefore be clear from Figure 5 that when each cutting element 7 is located in its operative position, such that its sharpened edge 13 is received within a corresponding recess 15a, that the sharpened edge 13 has passed below the engaging surface 15, and hence through any sheets of paper or the like resting against the engaging surface 15 of the hole punch.

[0020] Still with particular reference to Figure 4, the base 2 is provided with an upper engaging surface 15 which is opposed to the undersurface 3. The engaging surface 15 extends from a position indicated generally at 16, in front of the floating handle 6, to a position substantially below and behind the sharpened edges 13 of the cutting element 7. In this position, the engaging surface 15 terminates at an upstanding step 17 defining a locating means in the form of a locating surface 18 which is preferably orientated so as to be substantially perpendicular to the engaging surface 15. In a manner generally known *per se*, the locating surface 18 provides an abutment against which one or more sheets of paper or the like can be engaged when inserted into the hole punch against the engaging surface 15 and below the cutting elements 7. It will therefore be understood that the locating surface 18 is configured to engage an edge of the or each sheet of paper or the like inserted into the hole punch, in a predetermined position relative to the or each cutting element 7, thereby defining the "fully home" position of the or each sheet of paper in the hole punch.

[0021] As clearly illustrated in Figures 4 and 5, the engaging surface 15 is inclined downwardly in the orientation illustrated, towards the supporting surface 3, such that the engaging surface 15 approaches the support surface 3 in the region of the locating surface 18. In other words, it will be seen that the engaging surface 15 is inclined with respect to the supporting surface 3, such that the engaging surface has a minimum spacing D from the support surface substantially at the position of the locating means 18.

[0022] By virtue of the above-mentioned downward inclination of the engaging surface 15, when the hole punch 1 is positioned on a substantially horizontal worksurface 4, the engaging surface 15 is inclined with respect to the horizontal, which assists in positive location of paper sheets in the hole punch, and serves to help prevent inadvertent disengagement of the paper sheets from the hole punch. The downwardly inclined engaging surface uses the force of gravity to maintain sheets of paper inserted into the hole punch in their correct position against the locating means 18.

[0023] Referring again to Figure 4, the hole punch 1 illustrated, is also provided with an optical waveguide 19, such as, for example, a conventional light pipe. In the orientation of the hole punch 1 illustrated in Figure 4, the optical waveguide 19 is oriented substantially vertically such that its lowermost end 20 is located substantially immediately above the juncture between the engaging surface 15 and the locating surface 18, against which edges of sheets of paper to be punched become engaged when fully inserted into the hole punch. The uppermost end 21 of the optical waveguide is, in the orientation illustrated in Figure 4, located substantially vertically above the lowermost end 20.

[0024] The uppermost end 21 of the optical waveguide 19 is received within the narrow end of a generally frusto-conical shaped funnel or sleeve 22 which is mounted with respect to the operating handle 6 at a position immediately below an aperture 23 through the uppermost surface of the operating handle 6.

[0025] The light pipe of the above-described arrangement is preferably moulded from plastics material such as, for example, acrylonitrile butadiene styrene (ABS). The sleeve 22, in the most preferred embodiment, is

moulded from vacuum plated styrene material.

[0026] As will be appreciated, in the configuration of the hole punch 1 illustrated in Figure 4, the optical waveguide 19 serves to propagate light, for example, ambient light in the region of the locating surface 18, from the position of the locating surface 18 to the sleeve 22 in a position remote from the locating surface 18.

[0027] Turning now to consider the arrangement as illustrated in Figure 5, in which the handle 6 has been actuated to its operative position, it will be seen that because the sleeve 22 is fixedly mounted with respect to the handle 6, the sleeve 22 is caused to move downwardly with respect to the waveguide 19, such that the uppermost end 21 of the waveguide 19 passes further into the sleeve 22, and is caused to be deflected from its initial substantially vertical position illustrated in Figure 4. However, in the orientation illustrated in Figure 5, it will be clear that the waveguide 19 still serves to propagate light from the region of the locating surface 18 to the sleeve 22, in a position remote from the locating surface 18.

[0028] The light pipe 19, in optical communication with the aperture 23 through the uppermost surface 6 of the operating handle 6, serves to provide a visual indication of the presence or absence of sheet articles, such as, for example, paper, in the area immediately below the lowermost end 20 of the waveguide 19, i.e. in the region of the locating surface 18. With reference to Figure 4, a person looking downwardly (indicated schematically at 24) to the aperture 23 will, by virtue of the propagating properties of the optical waveguide 19, be able to view the region below the lowermost end 20 of the waveguide 19, i.e. the region of the locating surface 18. It will therefore be appreciated that by looking downwardly through the aperture 23 and through the waveguide 19, a person using the hole punch 1, will be able readily to assess whether or not a piece of paper or other sheet article is properly inserted into the "fully home" position into the hole punch, in which an edge of the or each sheet article abuts the locating surface 18. Typically, sheet articles such as sheets of paper, are a different colour to the engaging surface 15 of a hole punch, which serves to provide an easy visual indication of the presence or absence of sheet articles beneath the lowermost end 20 of the optical waveguide 19.

[0029] In the preferred arrangement illustrated in Figures 4, 5 and 6, the aperture 23 formed in the operating handle 6, is provided with a lens 25 there-across. The lens 25 is preferably moulded from polycarbonate material or acrylonitrile butadiene styrene (ABS).

[0030] As illustrated most clearly in Figure 6, the lens 25 is preferably configured for snap engagement with the sleeve 22, through the aperture 23 formed in the uppermost surface of the operating handle 6. The lens 25 is preferably circular or substantially ovoid in configuration, as illustrated in Figure 3, and is provided with a downwardly-depending skirt 26 therearound. The lowermost edge of the downwardly-depending skirt 26 is provided with an outwardly-projecting projection or lip 27.

[0031] The innermost surface of the sleeve 22 is provided with a groove 28 therearound sized and configured to receive and engage, as a snap fit, the projection or lip 27 carried by the skirt 26. It will therefore be seen from Figure 6 that the lens can simply and easily be inserted into the sleeve 22 by positioning the lens 25 over the aperture 23 such that the skirt 26 passes through the aperture 23 and into the sleeve 22, whilst being urged inwardly, until the outwardly-directed projection 27 becomes aligned with the corresponding groove 28, at which time the skirt 26 springs back, by virtue of its inherent resilience, such that the projection 27 is received within the groove 28, thereby retaining the lens 25 in position.

[0032] The lens 25 is preferably configured to disperse light propagated along the waveguide 19 towards the aperture 23 so that a person viewing the lens 25 from generally above the lens, can easily assess a change in optical conditions in the region below the waveguide (for example upon the insertion or removal of sheet articles), without requiring absolutely precise alignment of the person's line of sight with the axis of the waveguide 19. It is also proposed that the lens 25 could be a coloured lens.

[0033] However, in a preferred embodiment, the lens 25 is preferably colourless, but the optical waveguide 19 is configured so as to impart colour (for example green) to light reflected from a sheet of paper located below the lowermost end 20 of the waveguide 19, as that light is propagated along the waveguide 19. Such an arrangement provides a visual indication of (say) green light dispersing through the lens 25 upon insertion of paper into the hole punch in the "fully home" position. However, by virtue of the colourless nature of the lens 25 itself, the arrangement is configured such that when no paper is inserted into the hole punch, light reflecting off the engaging surface 15 and propagated along the waveguide 19, will not, by virtue of the colour of the engaging surface 15, be coloured green (or whatever colour) by the waveguide 19, such that when no paper is inserted into the hole punch, light dispersed by the lens 25 remains substantially colourless.

[0034] Whilst aspects of the present invention have been described with particular reference to a preferred arrangement, it should be appreciated that certain alterations and modifications can be made to the arrangement, without departing from the scope of the invention. For example, the arrangement could be modified such that the hole punch 1 further comprises a light source, for example, a light emitting diode (LED), which is arranged to illuminate the region below the lowermost end 20 of the waveguide 19, upon engagement of an edge of a sheet article and the locating surface 18. Such an arrangement could include sensing means, such as a microswitch arranged to be actuated upon engagement of a sheet article with the locating means of the arrange-

ment. Further still, the microswitch could be replaced with a piezo-electric device arranged to generate an electrical potential in direct response to the edge of one or more sheet articles engaging the locating means of the hole punch arrangement.

[0035] In the present specification "comprises" means "includes or consists of" and "comprising" means "including or consisting of".

[0036] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. A hole punch for punching holes through a sheet article or a stack of sheet articles, the hole punch comprising:

   a base and at least one cutting element, the or each cutting element being operable to move towards the base;
   the base having a substantially planar supporting surface for engagement with a worksurface, an opposed engaging surface to engage the face of a sheet article to be punched, and locating means configured to engage an edge of the or each sheet article in a predetermined position relative to the or each cutting element, wherein the engaging surface is inclined with respect to the supporting surface such that the engaging surface has a minimum spacing from the support surface substantially at the position of the locating means.

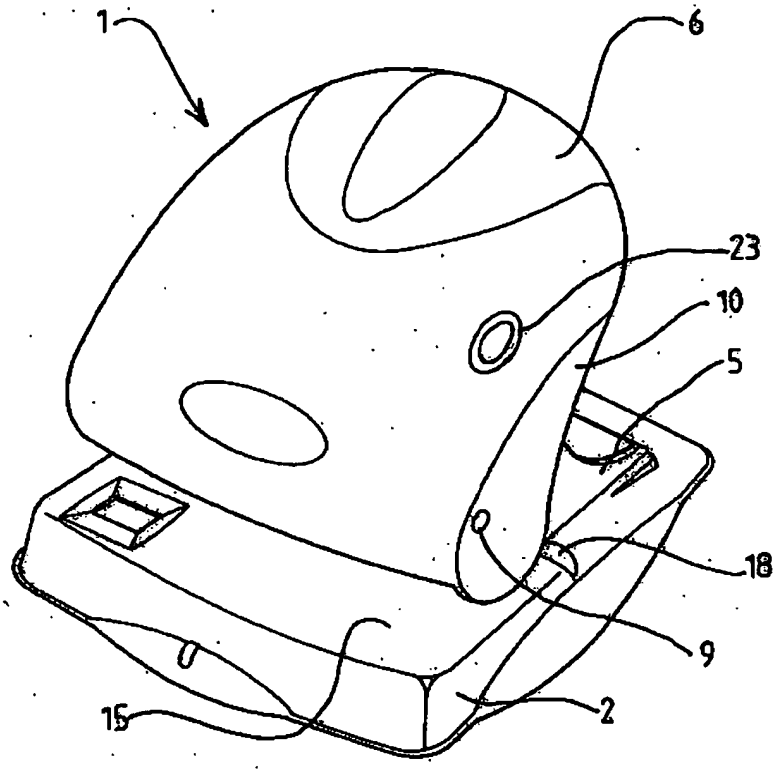
2. A hole punch according to claim 1, wherein the engaging surface is substantially planar.

3. A hole punch according to claim 2, wherein the angle of inclination of the engaging surface with respect to the supporting surface is between 1° and 15°.

4. A hole punch according to claim 2 or 3,wherein the angle of inclination of the engaging surface with respect to the supporting surface is between 4° and 12°.

5. A hole punch according to claim 2, 3 or 4, wherein the angle of inclination of the engaging surface with respect to the supporting surface is 8°.

FIG 1



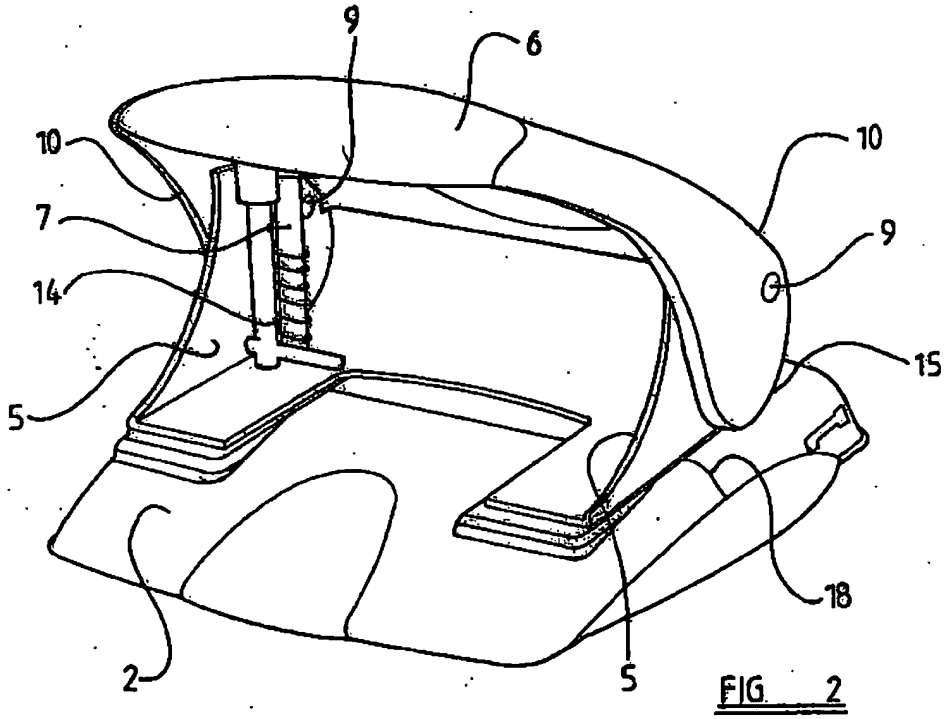


FIG 2

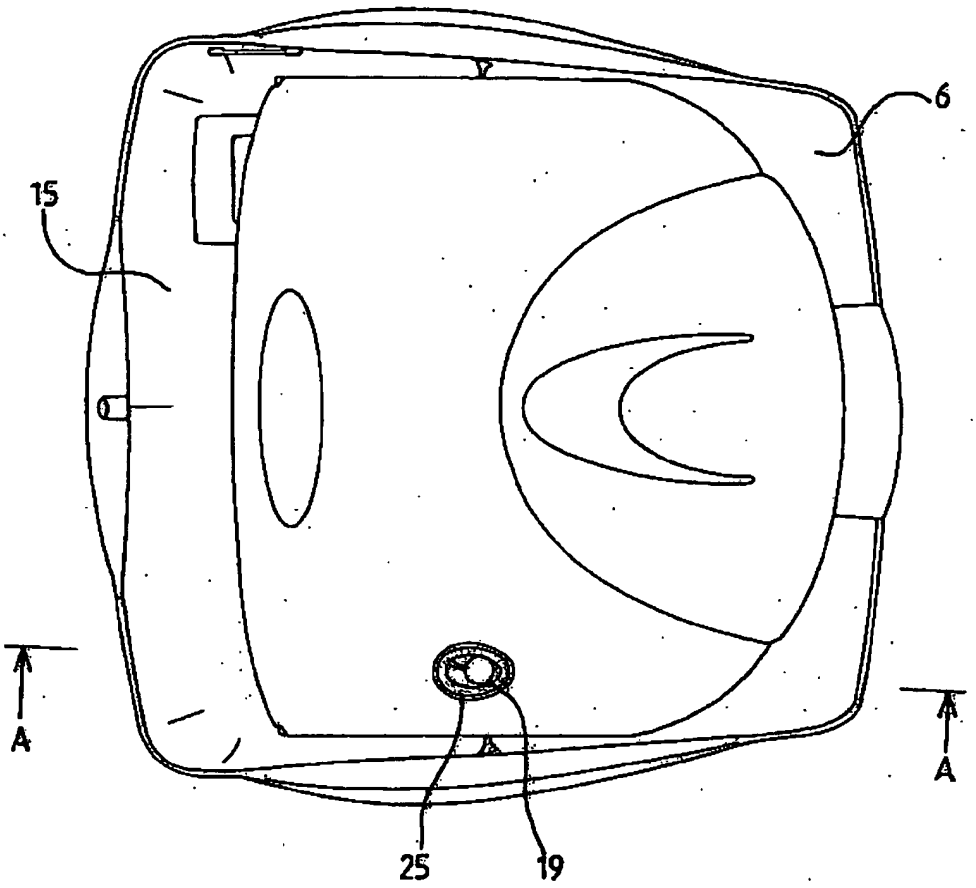


FIG 3

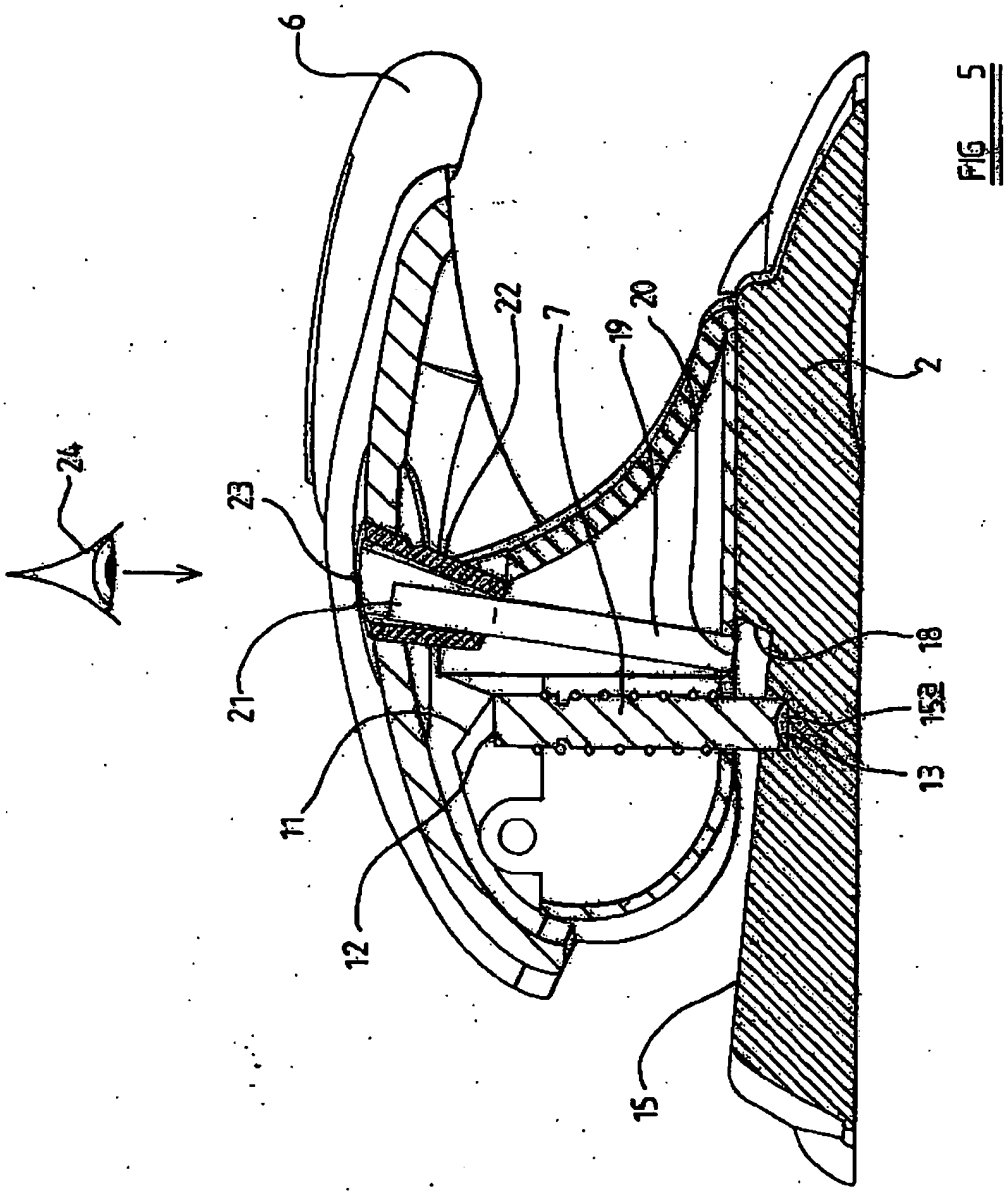


FIG 5

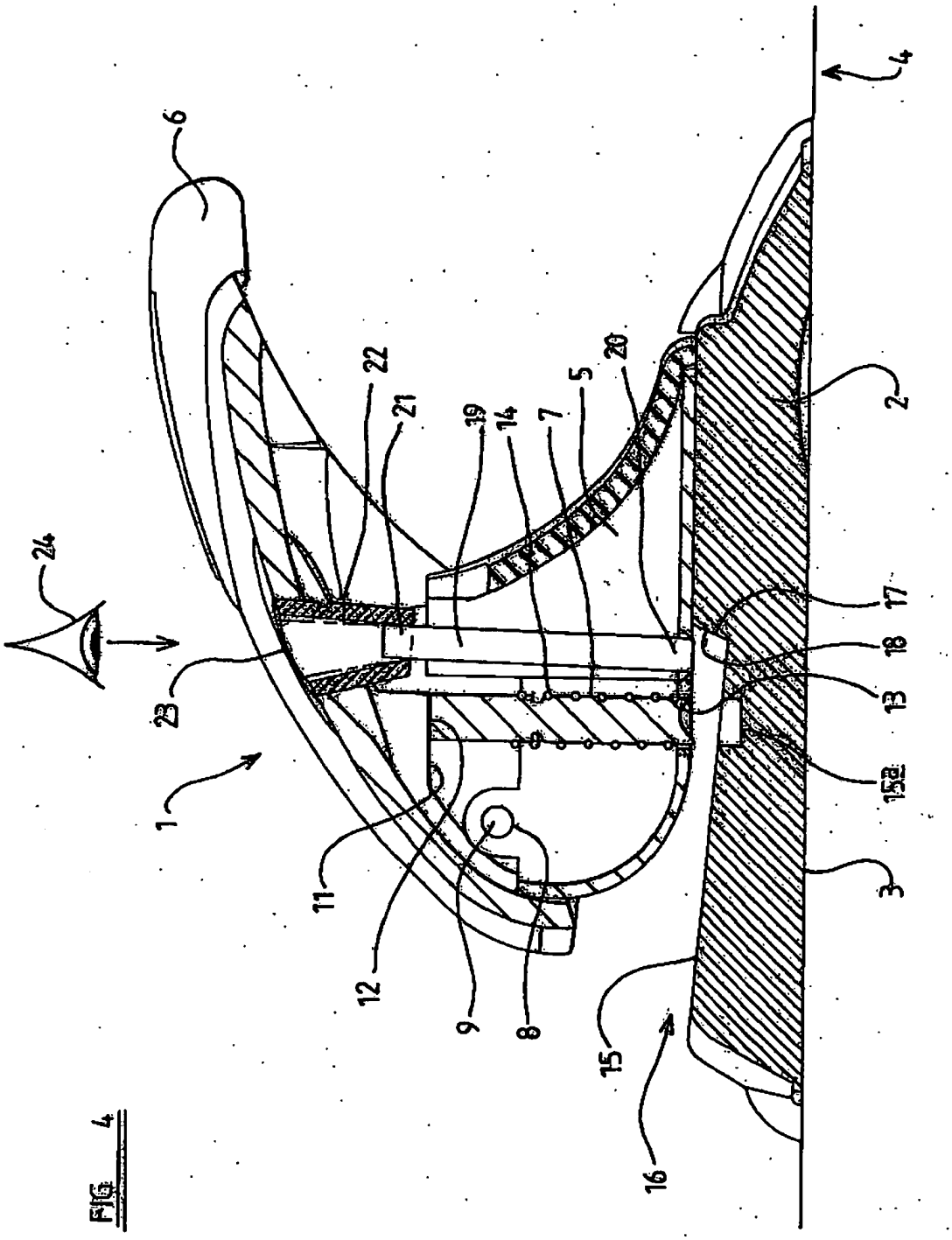


FIG 4

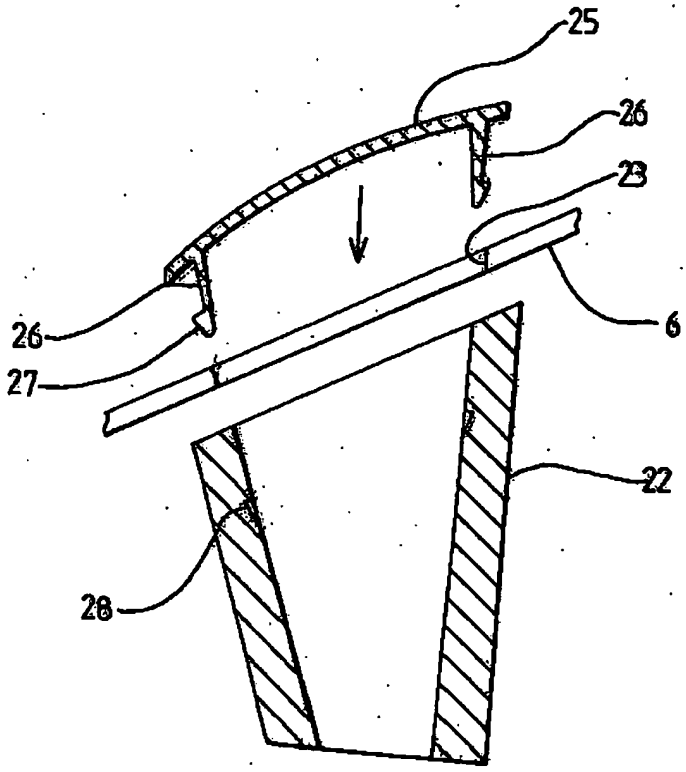


FIG 6